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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/929,213 | 08/14/2001 | Vinay B. Chikarmane | 42390P10759 | 2139 |

7590 09/17/2004

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| EXAMINER | |
|---|---|
| MUTSCHLER, BRIAN L | |
| **ART UNIT** | **PAPER NUMBER** |
| 1753 | |

DATE MAILED: 09/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/929,213 | CHIKARMANE ET AL. | |
| | Examiner | Art Unit | |
| | Brian L. Mutschler | 1753 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *05 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Comments*

1. The objection to the abstract has been overcome by Applicant's amendment.

2. In light of Applicant's arguments, the rejection of claims 2-4 under 35 U.S.C. 112, first paragraph has been withdrawn.

3. The rejection of claims 1-19 and 30 under 35 U.S.C. 112, second paragraph, has been overcome by Applicant's amendment.

4. The rejection of claims 1, 2, 5-7, 13, and 14 under 35 U.S.C. 102(e) over Liu et al. has been overcome by Applicant's amendment specifying the location where the formation of the passivation layer takes place. Likewise, the rejection of claims 15-19 under 35 U.S.C. 103 over Liu et al. as the primary reference has been overcome.

5. The rejection of claims 1-7, 13, 20, and 21 under 35 U.S.C. 102(e) over Hymes have been overcome by applicant's amendment specifying the location where the formation of the passivation layer takes place.

### *Claim Rejections - 35 USC § 112*

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 31 and 32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to

one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

While the original disclosure provided a method for performing the process claimed in claim 1, the specification does not disclose a machine accessible media having instructions for performing a similar process. Therefore, the claims to a machine accessible media constitute new matter.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 20-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 20 recites the limitation "a plating method selected from the group of electrolytic plating and electroless plating" in lines 2-3. This limitation is indefinite because the relationship between a step of electroless plating and an electroplating tool recited in claim 13, from which claim 20 depends. Since there are no other steps of electroplating, the purpose of the electroplating tool is unclear. While Applicant may be his own lexicographer, the term "electroplating" has a very specific meaning in the art, and that meaning does not include electroless plating. Therefore, Applicant should amend the claim so that the recited steps are consistent with the tools being used. The same applies to dependent claim 21.

Claim 22 recites the limitation "a plating process selected from the group consisting of electrolytic plating and electroless plating" in lines 8-9. As explained above, this limitation is indefinite because the relationship between the electroplating tool recited in line 2 and the process of electroless plating is unclear. The same applies to dependent claims 23-27.

### *Claim Rejections - 35 USC § 102*

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1, 2, 5-7, and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Rozbicki et al. (U.S. Pat. No. 6,554,914).

Regarding claim 1, Rozbicki et al. disclose a method comprising the steps of providing a substrate in a processing tool, forming a barrier layer on the substrate, forming a metal seed layer over the barrier layer, and forming a passivation layer over the seed layer (col. 5, line 32 to col. 6, line 3; col. 6, lines 42-52).

Regarding claim 2, the passivation layer is formed in a gas environment selected from hydrogen gas, and can also be performed in a nitrogen, fluorine, chlorine, silane, or germanium environment (col. 6, lines 42-52; col. 7, lines 34-45).

Regarding claim 5, the seed layer is formed of copper (col. 5, lines 53-55).

Regarding claim 6, the barrier layer can be made of tantalum (col. 5, lines 50-53).

Regarding claim 7, the processing tool is a metal-barrier deposition tool (col. 5, line 32 to col. 6, line 35).

Regarding claim 13, the process involves providing the substrate structure with the barrier layer, seed layer, and passivation layer into a contamination removal chamber where the nitrogen passivation layer is removed by heating and outgassing (col. 8, lines 12-29).

Since Rozbicki et al. teach all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

12. Claims 22, 28, and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al. (U.S. Pat. No. 6,395,642).

Regarding claim 22, Liu et al. teach a method comprising the steps of providing the substrate having barrier layer **120**, a seed layer **130**, and a passivation layer **140** in an electrochemical deposition tool and annealing the substrate in a forming gas to reduce the passivation layer, followed by electrochemically depositing copper **149** in trenches and vias of the substrate (col. 6, lines 21-38). The limitation "wherein the metal seed layer and the passivation layer formed substantially sequentially within a same processing tool" does not limit the method steps recited in the claim. The method requires "providing a substrate" that has a trench, a via, a barrier layer, a seed layer, and a passivation layer. As stated in the claim, the method by which the substrate is

made is not a positive step of the process and does not limit the step of providing the substrate.

Regarding claim 28, the method of Liu et al. inherently requires a system comprising a contamination removal chamber for the plasma cleaning to reduce the passivation layer **140** in situ with the electrochemical deposition of the copper **149** (col. 6, lines 21-38).

Claim 30 recite process claims that do not further limit the structure of the system recited in claim 28.

Since Liu et al. teach all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

### *Claim Rejections - 35 USC § 103*

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 3, 4, and 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rozbicki et al. (U.S. Pat. No. 6,554,914), as applied above to claims 1, 2, 5-7, and 13, and further in view of Applicant's admissions of prior art.

Rozbicki et al. disclose a method having the limitations recited in claims 1, 2, 5-7, and 13, as explained above in section 11. In addition, Rozbicki et al. disclose that the passivating agent may be provided as a gas or in other forms (col. 7, lines 34-38).

The method of Rozbicki et al. differs from the instant invention because Rozbicki et al. do not disclose the following:

a. The passivation is performed using a liquid selected from the group consisting of acids, bases, solvents, and de-ionized water, as recited in claim 3.

b. The passivation layer is formed using an oxygen gas environment, as recited in claim 4.

c. Forming the passivation layer comprises filling the chamber of the processing tool with a gas for a first period of time and cooling the substrate at a specified temperature for a second period of time, as recited in claim 8.

d. The first specified period of time is in a range of approximately 15-25 seconds, as recited in claim 9.

e. The second specified period of time is in a range of approximately 5-15 seconds, as recited in claim 10.

f. The specified temperature is about 15-20°C, as recited in claim 11.

g. The gas comprises oxygen gas at a pressure of up to 2 Torr, as recited in claim 12.

Applicant states that passivation by exposure liquid media such as acids, bases, solvents, and de-ionized water and to gases such as argon, helium, oxygen, hydrogen, nitrogen, etc., "at a range of temperatures and concentrations" is known in the art (see par. [0027] of the specification and page 11 of Applicant's response, where Applicant

states, "It is well known by those skilled in the are that many gases such as inert gases (e.g., argon, etc), hydrogen, fluorine containing gases forming gases, nitrogen gas, as well as liquids including acids, bases solvents and de-ionized water may passivate a surface by physical and/or chemical means.").

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the formation of the passivation layer of Rozbicki et al. to use other gases, including oxygen, or liquids because Applicant teaches that such methods are well-known in the art. Since these well-known methods equivalently passivate the seed layer, the substitution of well-known equivalents for the same person is deemed to be an obvious modification. Applicant also admits that the temperature and concentration for forming the passivation layer are well known. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the step of forming the passivation layer to use such well-known temperatures and concentrations, as well as the time of exposure and pressure of the gas, because these variables are dependent on temperature and concentration.

15. Claims 14, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rozbicki et al. (U.S. Pat. No. 6,554,914), as applied above to claims 1, 2, 5-7, and 13, and further in view of Liu et al. (U.S. Pat. No. 6,395,642).

Rozbicki et al. disclose a method having the limitations recited in claims 1, 2, 5-7, and 13, as explained above in section 11.

Regarding claim 14, Rozbicki et al. teach the removal of oxide using a reducing plasma such as hydrogen (col. 7, line 66 to col. 8, line 1).

Regarding claims 20 and 21, copper is deposited in trenches and vias of the substrate using an electroplating method (col. 1, lines 1-38; col. 8, lines 8-11).

The method of Rozbicki et al. differs from the instant invention because Rozbicki et al. do not disclose a step of annealing the substrate structure in forming gas to remove the passivation layer, as recited in claim 14.

Liu et al. disclose a method comprising the steps of forming a barrier layer on a substrate, forming a seed layer on the barrier layer, and forming a passivation layer on the seed layer (col. 5, line 60-col. 6, line 11). The passivation comprises an oxide layer, which is annealed by reduction in a forming gas (col. 6, lines 21-38).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified hydrogen plasma used to remove oxide in the method of Rozbicki et al. to use a forming gas a taught by Liu et al. because Liu et al. teaches that forming gas is a suitable material for the removal of oxide from a seed layer prior to electroplating.

16. Claims 15, 17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rozbicki et al. (U.S. Pat. No. 6,554,914) in view of Liu et al. (U.S. Pat. No. 6,395,642) , as applied above to claims 14, 20, and 21, and further in view of Nogami et al. (U.S. Pat. No. 6,242,349).

Rozbicki et al. and Liu et al. describe a method having the limitations recited in claims 14, 20, and 21 of the instant application, as explained above in section 15.

The method described by Rozbicki et al. and Liu et al. differs from the instant invention because they do not disclose the following:

a. Flowing forming gas for a specified period of time at a seed anneal temperature of about 250°C, as recited in claim 15.

b. The specified period of time is about 30 seconds, as recited in claim 17.

c. The forming gas comprises about 95% nitrogen and 5% hydrogen, as recited in claim 19.

Regarding claims 15, 17, and 19, the anneal temperature, anneal time, and gas composition are all result effective variables because they depend on the properties of the object being annealed, such as the composition and the thickness, as well as the desired outcome of the annealing process, such as removal of contamination, which is the apparent objective of the instant invention, or formation of a preferred crystal structure. For example, Nogami et al. teach the annealing of a copper seed layer prior to the deposition of a bulk copper layer using a forming gas environment of hydrogen, nitrogen, and argon (hydrogen is the reducing species), wherein the annealing takes place at a temperature between 100°C and 400°C for a time of about 30 seconds to about 30 minutes (col. 5, lines 12-20).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method described by Rozbicki et al. and Liu et

al. to use the claimed operating parameters as taught by Nogami et al. to control each of the variables to be optimized for the conditions of the substrate being treated.

17. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rozbicki et al. (U.S. Pat. No. 6,554,914) in view of Liu et al. (U.S. Pat. No. 6,395,642) and Nogami et al. (U.S. Pat. No. 6,242,349), as applied above to claims 15, 17, and 19, and further in view of Achuthan et al. (U.S. Pat. No. 6,498,397).

Rozbicki et al., Liu et al., and Nogami et al. describe a method and system having the limitations recited in claims 15, 17, and 19 of the instant invention, as explained above in section 16.

The method described by Rozbicki et al., Liu et al., and Nogami et al. differs from the instant invention because they do not teach the following:

a. Cooling the annealed substrate in forming gas for a specified period of time at a temperature of 15-20°C, as recited in claim 16.

b. The specified period of time is about 25 seconds, as recited in claim 18.

Regarding claims 16 and 18, Achuthan et al. teach a method of annealing a copper seed layer prior to the deposition of copper, wherein the annealing is carried out at temperatures up to 400°C and is following by rapid cooling at a rate of more than 1°C per second to form a roughened seed surface to improve the adhesion between the seed layer and the bulk copper layer (col. 5, lines 39-49). The exact temperature and time at which the cooling occurs is a result effective variable that depends on the properties of the substrate being treated.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method described by Rozbicki et al., Liu et al., and Nogami et al. to use a step of rapid cooling as taught by Achuthan et al. because rapid cooling provides greater adhesion between the seed layer and the bulk copper layer. The exact operating conditions, such as time and temperature, would be obvious to one skilled in the art because the operating conditions are dependant upon the properties of the substrate being treated.

18. Claims 23 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (U.S. Pat. No. 6,395,642), as applied above to claims 22, 28, and 30, and in view of Nogami et al. (U.S. Pat. No. 6,242,349) and Cohen (U.S. Pat. No. 6,027,630).

Liu et al. teaches a method and system having the limitations recited in claims 22, 28, and 30 of the instant invention, as explained above in section 12.

The method of Liu et al. differs from the instant invention because Liu et al. do not teach the following:

a. Annealing and depositing a conductive material under vacuum conditions, as recited in claims 23 and 29. (Although claim 29 is an apparatus claim reciting process limitations, the apparatus must be capable of operating under vacuum conditions, which imparts some structural properties to the apparatus.)

Nogami et al. teach the annealing of a seed layer before deposition of bulk copper, wherein the annealing is performed under vacuum conditions (col. 5, lines 12-

20). Cohen teaches that electroplating under vacuum conditions degases the electroplating solution and avoids pitting of the electroplated layer (col. 15, lines 24-53; col. 17, lines 13-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method and system of Liu et al. to anneal and deposit under vacuum conditions as taught by Nogami et al. and Cohen because annealing and depositing under vacuum conditions increases the uniformity of the layers.

19. Claims 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (U.S. Pat. No. 6,395,642), as applied above to claims 1, 2, 5-7, 13, 14, 20-22, 28, and 30, and in view of Nogami et al. (U.S. Pat. No. 6,242,349).

Liu et al. teaches a method and system having the limitations recited in claims 22, 28, and 30 of the instant invention, as explained above in section 12.

The method of Liu et al. differs from the instant invention because Liu et al. do not teach the following:

a. Flowing forming gas for a specified period of time at a seed anneal temperature of about 250°C, as recited in claim 24.

b. The specified period of time is about 30 seconds, as recited in claim 26.

c. The forming gas comprises about 95% nitrogen and 5% hydrogen, as recited in claim 19.

Regarding claims 15, 17, 19, 24, and 26, the anneal temperature, anneal time, and gas composition are all result effective variables because they depend on the properties of the object being annealed, such as the composition and the thickness, as well as the desired outcome of the annealing process, such as removal of contamination, which is the apparent objective of the instant invention, or formation of a preferred crystal structure. For example, Nogami et al. teach the annealing of a copper seed layer prior to the deposition of a bulk copper layer using a forming gas environment of hydrogen, nitrogen, and argon (hydrogen is the reducing species), wherein the annealing takes place at a temperature between 100°C and 400°C for a time of about 30 seconds to about 30 minutes (col. 5, lines 12-20).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Liu et al. to use the claimed operating parameters as taught by Nogami et al. to control each of the variables to be optimized for the conditions of the substrate being treated.

20. Claims 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (U.S. Pat. No. 6,395,642), as applied above to claims 22, 28, and 30, and in view of Achuthan et al. (U.S. Pat. No. 6,498,397).

Liu et al. teaches a method and system having the limitations recited in claims 22, 28, and 30 of the instant invention, as explained above in section 12.

The method of Liu et al. differs from the instant invention because Liu et al. do not teach the following:

a. Cooling the annealed substrate in forming gas for a specified period of time at a temperature of 15-20°C, as recited in claim 25.

b. The specified period of time is about 25 seconds, as recited in claim 27.

Regarding claims 25 and 27, Achuthan et al. teach a method of annealing a copper seed layer prior to the deposition of copper, wherein the annealing is carried out at temperatures up to 400°C and is following by rapid cooling at a rate of more than 1°C per second to form a roughened seed surface to improve the adhesion between the seed layer and the bulk copper layer (col. 5, lines 39-49). The exact temperature and time at which the cooling occurs is a result effective variable that depends on the properties of the substrate being treated.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Liu et al. to use a step of rapid cooling as taught by Achuthan et al. because rapid cooling provides greater adhesion between the seed layer and the bulk copper layer. The exact operating conditions, such as time and temperature, would be obvious to one skilled in the art because the operating conditions are dependant upon the properties of the substrate being treated.

21. Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rozbicki et al. (U.S. Pat. No. 6,554,914).

Regarding claim 31, Rozbicki et al. disclose a method comprising the steps of providing a substrate in a processing tool, forming a barrier layer on the substrate,

forming a metal seed layer over the barrier layer, and forming a passivation layer over the seed layer (col. 5, line 32 to col. 6, line 3; col. 6, lines 42-52).

Regarding claim 32, the passivation layer is formed in a gas environment selected from hydrogen gas, and can also be performed in a nitrogen, fluorine, chlorine, silane, or germanium environment (col. 6, lines 42-52; col. 7, lines 34-45).

The invention of Rozbicki et al. differs from the instant invention because Rozbicki et al. do not disclose that the method may be provided on a machine accessible media.

Such devices as are used by Rozbicki et al., i.e., the INOVA PVD apparatus, are typically computer controlled. Regardless, automating a manual process is deemed to be an obvious modification to a known process (see MPEP 2144.04). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method disclosed by Rozbicki et al. to provide the method in a machine accessible format because the automation of a known process is considered obvious to one skilled in the art.

### *Response to Arguments*

22. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

23. Applicant's arguments with respect to claims 22-30, filed August 5, 2004, have been fully considered but they are not persuasive.

24. Applicant argues that the step of forming a passivation layer over the metal seed layer while in the processing tool distinguishes claims 22 and 28 over the prior art of record.

25. As indicated above, the step of forming a passivation layer over the metal seed layer while in the processing tool does not further limit the method of claim 22 or the system of claim 28. In claim 22, the method recites "providing a substrate" and defines features that the substrate must have, e.g., a barrier layer, a seed layer, etc. However, the limitation that "the metal seed layer and the passivation layer are formed substantially sequentially within a same within a same processing tool" does not positively limit the step of providing a substrate. There is no relationship between how or where the metal seed layer and passivation layer are formed and the process recited in claim 22.

26. Similarly, in claim 28, the limitation "wherein the metal seed layer and the passivation layer are formed substantially sequentially within a same within a same processing tool" does not further limit the system. This limitation is a product-by-process limitation that does not affect the system being claimed. Therefore, while the limitation has been considered, the limitation is not deemed to further limit the claims.

## ***Conclusion***

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571)

272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BLM
September 13, 2004

NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700